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Description

The present invention relates to a form overlay type document printing apparatus, in which blank paper, on which no form has been previously printed, is used and a form is printed on the paper together with characters by using a dot printer.

Such apparatus is known from US-A-4 081 604 and comprises a form overlay type document printing apparatus for receiving form data, repetition character data, and variable character data from a host computer and for producing a printed output corresponding thereto, the apparatus comprising:

a format memory;

a character data buffer;

input data means for supplying form data, repetition character data, and variable character data received from the host computer and for supplying form data to said format memory, and variable character data to said character data buffer;

a form pattern generator for generating form printing signals corresponding to said format data stored in said format memory;

a printing pattern generator for generating character printing signals corresponding to said variable character data; and

an output buffer for combining said form printing signals with said character printing signals to produce character printing signals and signals for driver signals for each document in said succession of documents.

Another form overlay type document printing apparatus is described in each of Japanese Patent Applications Nos. 110143/81 and 71081/82. The printing apparatus disclosed in each of these laid-open applications includes a printing data buffer and a form buffer and is advantageous in that when the same data are repeatedly printed, if form data has been transmitted once from a host computer and stored in the form buffer it is sufficient thereafter to transmit only printing data until the form is changed. That is, it is not necessary to transmit a combination of printing data and form data from the computer every time. Also, a printing pattern and a form pattern can be generated in the printing apparatus by transmitting simple codes only. This simplifies the processing at the host computer side and reduces the amount of data that must be transmitted.

In the prior art, however, there is a problem that in the case where a document comprising a number of sheets is to be produced with the same form and with some data which varies with every sheet and some data which is common to every sheet. This situation requires the combination of the varying or unique data and the common data to be transmitted for every sheet from the computer. As a result the time required for data transmission is prolonged and the efficiency of the transmission line is reduced.

US-A-4 031 519 published 27.06.1977 teaches the repeat use of part of the printer page buffer character data but does not address the problem of combining short runs of repeated character data with long runs of repeated form overlay data.

An object of the present invention is an efficient and simple form overlay type document printing apparatus.

Another object of the present invention is the reduction of duplicate data transmitted over a transmission line in connection with a form overlay type document printing apparatus.

Still another object of the present invention is to eliminate the multiple transmission of data which is common to a plurality of forms to be printed by a form overlay type document printing apparatus.

According to one aspect of the invention, the apparatus defined in the second paragraph of this specification is characterised in that a repetition character data memory is arranged to receive said repetition character data from said input data means;

said printing pattern generator is arranged to receive repetition character data from said repetition character data memory and to generate further character printing signals in response thereto; and

a form pattern buffer is provided for combining said form printing signals and said further printing signals to supply a selected sequence of combined form printing signals for a succession of documents.

These and other objects, features, and advantages of the invention, as well as the invention itself, will become more apparent to those skilled in the art when considered in the light of the accompanying drawings wherein:

Figure 1 is a block diagram of an embodiment of the form overlay type document printing apparatus of the present invention; and

Figure 2 is an explanatory diagram of the operation of the apparatus of Figure 1.

Figure 1 is a block diagram showing an embodiment of the printing apparatus according to the present invention. A transfer signal (Figure 2) inputted into a printing apparatus from a host computer is classified into format designating data F1, F2..., repetition data R1, R2... which do not change over plural pages, and printing data X1, X2... which change with every page or document, as shown in Figure 2.

An input control section 1 discriminates format designating data, repetition data, and ordinary printing data or variable data, out of an input signal applied from a host computer, and causes a repetition data memory 3 and a variable data buffer 4 to store the repetition data and the variable data, respectively. Each of the repetition data memory 3 and the variable data buffer 4 has the capacity for storing a page or document. Data corresponding to one line on the document are successively read out of the respective memories 2, 3 and 4.

The format memory 2 stores in advance plural kinds of formats F1, F2,.... The designated format

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data read out of the format memory 2 is converted into a format pattern by a form pattern generator 5 and the form pattern is temporarily stored in a form pattern buffer 6.

A character code read out of the repetition data memory 3 is converted into a printing pattern by a printing pattern generator 7 and ORed with the form pattern in the form pattern buffer 6. Another character code read out of the variable data buffer 4 is converted into another printing pattern by the printing pattern generator 7 and is temporarily stored in a printing pattern buffer 8. The outputs of the respective pattern buffers 6 and 8 are ORed with each other by an output buffer 9 to form e drive signal which is then applied to a head driver 10. On the basis of the drive signal, the head driver 10 drives a printer head 11.

After the format designating data, F1, end the repetition data, R1, have been inputted into the above-mentioned printing apparatus from a host computer, only variable data X1, X2,..., Xn, are inputted, as shown in Figure 2. The variable data are combined with the format data, F1, and the repetition data, R1, which have been respectively stored in the format memory 2 and the repetition data memory 3, to constitute a document and the contents thereof (F1, R1, X1), (F1, R1, X2), ..., (F1, R1, Xn), as shown in the right hand side of Figure 2 are printed on the documents to reproduce the variable and repetitive contents.

Upon completion of printing a predetermined number of documents, that is n, the repetition data memory 3 is cleared. When the repetition data, R2, is then inputted, the repetition data memory 3 stores the new repetition data, R2, while the format designating data, F1, is left as it was because the form data, F1, has not been changed in this example. Then the variable data Y1, Y2,... are inputted so that the documents -having form, repetition, and variable data, (F1, R2, Y1), (F1, R2, Y2), ... are successively printed every time the variable data are inputted for e document.

Although a thermosensitive line dot printer is used in this embodiment, the present invention can be achieved by using any type of recording system, such as electrostatic, ink jet, electrophotographic, electro-discharge, electrolytic, magnetic, etc., and any type of head structure, such as e line dot system, a dot matrix system, etc.

According to the present invention, as described above, in a form overlay type document printing apparatus in which a printing data buffer and a form buffer are provided separately so that only printing data are transferred from a host computer unless form data are changed, printing date for one document is divided into a part which is repeated without changing over e plurality of documents end a part which changes with every document so that only the variable data are transferred from the host computer unless the repetition data are changed. The respective data corresponding to every line of a document are read out of a format memory, a

repetition memory, and a variable data buffer end are converted into printing patterns. The patterns are combined end outputted to the printing apparatus. Thus, in comparison with the conventional overlay type document printing apparatus, in which ell the printing data other than the format data are transferred for every page, the printing apparatus of the present invention has an advantage thet the amount of data to be transferred is reduced so thet not only the transferring time is reduced but the processing by the computer can be simplified.

Claims

1. A form overlay type document printing apparatus for receiving form data, repetition character data, and variable character data from a host computer and for producing a printed output corresponding thereto, the apparatus comprising:
   a format memory (2);
   a character data buffer (4);
   input data means (1) for supplying form data, repetition character data, and variable character data received from the host computer and for supplying form data to said format memory (2), and variable character data to said character data buffer (4);
   a form pattern generator (5) for generating form printing signals corresponding to said format data stored in said format memory (2);
   a printing pattern generator (7) for generating character printing signals corresponding to said variable character data; and
   an output buffer (9) for combining said form printing signals with said character printing signals to produce corresponding print driver signals for each document in said succession of documents, characterised in that:
   a repetition character data memory (3) is arranged to receive said repetition character data from said input data means (1);
   said printing pattern generator (7) is arranged to receive repetition character data from said repetition character data memory (3) and to generate further character printing signals in response thereto; and
   a form pattern buffer (6) is provided for combining said form printing signals and said further printing signals to supply a selected sequence of combined form printing signals for e succession of documents.

2. A form overlay type document printing apparatus according to claim 1, characterised by
   a printer head (11); and
   a head driver circuit (10) for controlling said printer head (11) to generate printed material corresponding to said print driver signals.

3. A form overlay type document printing apparatus according to claim 2, characterised in that said printer head (11) comprises e dot matrix print head.

4. A form overlay type document printing apparatus, comprising:

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a printing data memory (4, 3) for storing variable printing character data which is unique to each document to be printed and repetition printing character data which is common to each document within a first succession of documents to be printed;

a format data memory (2) for storing format printing data defining a form to be printed on each document within a second succession of documents to be printed, said second succession of documents including said first succession of documents;

means (6, 8, 9) for combining said format printing data, said repetition printing character data, and said variable printing character data to produce print control signals corresponding to said format data, said repetition character data and said variable character data for each document to be printed;

means (10, 11) for producing printed documents corresponding to said print control signals; and

transferring means (1) for transferring to said printing data memory (4, 3) said variable printing character data prior to the printing of each document and said repetition printing character data prior to the printing of the first document in said first succession of documents and to said format data memory (2) said format printing data prior to the printing of the first document in said succession of documents,

characterised in that said transferring means is arranged to transfer new repetition printing character data to said printing data memory after the printing of said first succession of documents.

5. A form overlay type printing apparatus according to claim 4, characterised in that said printing data memory comprises a variable data buffer (4) for storing said variable printing character data and a repetition character data memory (3) for storing said repetition printing character data.

6. A form overlay type printing apparatus according to claim 5, characterised in that said combining means comprises:

a printing pattern buffer (8) for receiving and storing said variable printing character data;

a form pattern buffer (6) for receiving, combining, and storing said format printing data and said repetition printing character data; and

an output buffer (9) for receiving, combining, and storing the contents of said printing pattern buffer (8) and said form pattern buffer (6).

7. A form overlay type printing apparatus according to claim 6, characterised in that said transferring means comprises an input control section (1) connected to said format memory (2), said repetition character data memory (3), and said variable character data buffer (4) and adapted to be connected to a host computer for the receipt of said variable printing character data, said repetition printing character data, and said format printing data therefrom.

8. A form overlay data printing apparatus according to claim 7, characterised in that said producing means comprises:

a print head (11); and

a print head driver (10) for controlling the operation of said print head (11) in accordance with said print control signals.

1. Formularüberlagerungs-Druckvorrichtung zum Empfangen von Formulardaten, Wiederholzeichendaten und variablen Zeichendaten von einem Hauptrechner und zum Erzeugen eines dementsprechenden Ausdruckes, wobei die Vorrichtung umfaßt:

einen Formatspeicher (2);

einen Zeichendatenpuffer (4);

eine Dateneingabeeinrichtung (1) zur Lieferung von Formulardaten, Wiederholzeichendaten und variablen Zeichendaten, die vom Hauptrechner empfangen wurden, sowie zur Lieferung von Formulardaten an den Formatspeicher (2) und von variablen Zeichendaten an den Zeichendatenpuffer (4);

einen Formularmuster-Generator (5) zum Erzeugen von Formulardrucksignalen entsprechend den im Formatspeicher (2) gespeicherten Formatdaten;

einen Druckmuster-Generator (7) zum Erzeugen von Zeichendrucksignalen entsprechend den variablen Zeichendaten; und

einen Ausgabepuffer (9) zum Kombinieren der Formulardrucksignale mit den Zeichendrucksignalen, um entsprechende Druckertreibersignale für jedes Dokument in der Folge von Dokumenten zu erzeugen, dadurch gekennzeichnet, daß

ein Wiederholzeichendatenspeicher (3) eingerichtet ist zum Empfangen der Wiederholzeichendaten von der Dateneingabeeinrichtung (1);

der Druckmuster-Generator (7) eingerichtet ist zum Empfangen von Wiederholzeichendaten von dem Wiederholzeichendatenspeicher (3) und zum Erzeugen weiterer Zeichendrucksignale in Abhängigkeit hiervon; und

ein Formularmusterpuffer (6) vorgesehen ist zum Kombinieren der Formulardrucksignale und der weiteren Drucksignale, um eine ausgewählte Folge von kombinierten Formulerdruckzeichen zu liefern für eine Folge von Dokumenten.

2. Formularüberlagerungs-Druckvorrichtung nach Anspruch 1, gekennzeichnet durch

einen Druckerkopf (11) und

eine Kopftreiberschaltung (10) zum Steuern des Druckerkopfes (11), um Druckmaterial entsprechend den Drucktreibersignalen herzustellen.

3. Formularüberlagerungs-Druckvorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß der Druckerkopf (11) einen Punktmatrix-Druckkopf umfaßt.

4. Formularüberlagerungs-Druckvorrichtung, umfassend:

einen Druckdatenspeicher (4, 3) zum Speichern von variablen Druckzeichendaten, welche für jedes zu druckende Dokument spezifisch sind, und von Wiederholdruckzeichendaten, welche allen Dokumenten innerhalb einer ersten Folge von zu druckenden Dokumenten gemeinsam sind;

einen Formatdatenspeicher (2) zum Speichern

von Formatdruckdaten, welche innerhalb einer zweiten Folge von zu druckenden Dokumenten ein auf jedes Dokument zu druckendes Formular bestimmen, wobei die zweite Folge von Dokumenten die genannte erste Folge von Dokumenten einschließt;

eine Einrichtung (6, 8, 9) zum Kombinieren der Formatdruckdaten, der Wiederholdruckzeichendaten und der variablen Druckzeichendaten, die Druckzeichensignale entsprechend den Formatdaten, den Wiederholdruckzeichendaten und den variablen Zeichendaten für jedes zu druckende Dokument zu erzeugen;

eine Einrichtung (10, 11) zum Herstellen gedruckter Dokumente entsprechend den Drucksteuersignalen; und

eine Übertragungseinrichtung (1), um vor dem Drucken eines jeden Dokuments die variablen Druckzeichendaten und vor dem Drucken des ersten Dokumentes in der ersten Folge von Dokumenten die Wiederholdruckzeichendaten in den Druckdatenspeicher (4, 3) zu übertragen. und vor dem Drucken des ersten Dokumentes in der genannten Folge von Dokumenten die Formatdruckdaten an den Formatdatenspeicher (2) zu übertragen, und dadurch gekennzeichnet, daß die Übertragungseinrichtung dazu eingerichtet ist, nach dem Drucken der ersten Folge von Dokumenten neue Wiederholdruckzeichendaten an den Druckdatenspeicher zu übertragen.

5. Formularüberlagerungs-Druckvorrichtung nach Anspruch 4, dadurch gekennzeichnet, daß der Druckdatenspeicher einen Variabeldatenpuffer (4) zum Speichern der variablen Druckzeichendaten sowie einen Wiederholdatenspeicher (3) zum Speichern der Wiederholdruckzeichendaten umfaßt.

6. Formularüberlagerungs-Druckvorrichtung nach Anspruch 5, dadurch gekennzeichnet, daß die Einrichtung zum Kombinieren umfaßt:

einen Druckmusterpuffer (8) zum Empfangen und Speichern der variablen Druckzeichendaten;

einen Formularmusterpuffer (6) zum Empfangen, Kombinieren und Speichern der Formatdruckdaten und der Wiederholdruckzeichendaten; und

einen Ausgabepuffer (9) zum Empfangen, Kombinieren und Speichern der Inhalte des Druckmusterpuffers (8) und des Formularmusterpuffers (6).

7. Formularüberlagerungs-Druckvorrichtung nach Anspruch 6, dadurch gekennzeichnet, daß die Übertragungseinrichtung einen mit dem Formatspeicher (2) verbundenen Eingabesteuerabschnitt (1), den Wiederholzeichendatenspeicher (3) und den Variabelzeichendatenpuffer (4) umfaßt und zum Anschluß an einen Hauptrechner eingerichtet ist, um von ihm die variablen Druckzeichendaten, die Wiederholdruckzeichendaten und die Formatdruckdaten zu empfangen.

8. Formularüberlagerungs-Druckvorrichtung nach Anspruch 7, dadurch gekennzeichnet, daß die Herstelleinrichtung umfaßt:

einen Druckkopf (11) und

einen Druckkopftreiber (10) zum Steuern der

Operation des Druckkopfes (11) entsprechend den Drucksteuersignalen.

Revendications

1. Appareil d'impression de documents du type formulaire à remplir, prévu pour recevoir des données relatives au formulaire, des données relatives aux caractères répétitifs et des données relatives aux caractères variables en provenance d'un ordinateur principal et pour produire un document imprimé leur correspondant, l'appareil comportant:

une mémoire (2) de formulaire;

une mémoire-tampon (4); de données relatives aux caractères;

des moyens (1) d'entrée de données pour amener les données relatives au formulaire, les données relatives aux caractères répétitifs et les données relatives aux caractères variables reçues en provenance de l'ordinateur principal et pour amener les données relatives au formulaire à ladite mémoire (2) de formulaire et les données relatives aux caractères variables à ladite mémoire-tampon (4) de données relatives aux caractères;

un générateur (5) de formulaire pour générer des signaux d'impression du formulaire correspondant auxdites données relatives au formulaire mémorisées dans ladite mémoire (2) de formulaire;

un générateur (7) de configuration d'impression pour générer des signaux d'impression de caractères correspondant auxdites données relatives aux caractères variables; et

une mémoire-tampon de sortie (9) pour combiner lesdits signaux d'impression du formulaire avec lesdits signaux d'impression des caractères pour produire des signaux pilotes d'impression correspondants pour chaque document de ladite succession de documents, caractérisé

en ce qu'une mémoire (3) de données relatives aux caractères répétitifs est conçue pour recevoir lesdites données relatives aux caractères répétitifs en provenance desdits moyens (1) d'entrée des données;

en ce que ledit générateur (7) de configuration d'impression est conçu pour recevoir les données relatives aux caractères répétitifs en provenance de ladite mémoire (3) de données relatives aux caractères répétitifs et pour générer d'autres signaux d'impression de caractères en réponse à ces données; et

en ce qu'une mémoire-tampon (6) de formulaire est prévue pour combiner lesdits signaux d'impression de formulaire et lesdits autres signaux d'impression pour fournir une séquence sélectionnée de signaux combinés d'impression de formulaire pour une succession de documents.

2. Appareil d'impression de documents du type formulaire à remplir selon la revendication 1, caractérisé

par une tête d'imprimante (11); et

par un circuit pilote (10) de la tête d'imprimante pour commander à ladite tête d'imprimante (11)

de produire un document imprimé correspondant auxdits signaux pilotes d'impression.

3. Appareil d'impression de documents du type formulaire à remplir selon la revendication 2, caractérisé en ce que ladite tête d'imprimante (11) est constituée d'une tête d'imprimante à matrice de points.

4. Appareil d'impression de documents du type formulaire à remplir comportant:

une mémoire (4, 3) de données d'impression pour mémoriser les données relatives aux caractères d'impression variables qui sont exclusives à chaque document imprimé et les données relatives aux caractères d'impression répétitifs qui sont communes à chaque document faisant partie d'une première succession de documents à imprimer;

une mémoire (2) des données relatives au formulaire pour mémoriser les données d'impression du formulaire définissent un formulaire à imprimer sur chaque document faisant partie d'une seconde succession de documents à imprimer, ladite seconde succession de documents incluent ladite première succession de documents;

des moyens (6, 8, 9) pour combiner lesdites données d'impression du formulaire, lesdites données relatives eux caractères d'impression répétitifs, et lesdites données relatives aux caractères d'impression variables pour produire des signaux de commande d'impression correspondant auxdits données relatives aux formulaires, auxdites données relatives aux caractères répétitifs et auxdites données relatives aux caractères variables pour chaque document à imprimer;

des moyens (10, 11) pour produire des documents imprimés correspondent auxdits signaux de commande d'impression; et

des moyens de transfert (1) pour transférer à ladite mémoire (4, 3) de données d'impression lesdites données relatives aux caractères d'impression variables avant l'impression de chaque document et lesdites données relatives aux caractères d'impression répétitifs avant l'impression du premier document de ladite première succession de documents et pour transférer à ladite mémoire (2) des données relatives au formulaire lesdites données d'impression du formulaire avant l'impression du premier document de ladite succession de documents,

caractérisé en ce que lesdits moyens de transfert sont conçus pour transférer de nouvelles données relatives aux caractères d'impression

répétitifs à ladite mémoire de données d'impression après l'impression de la première succession des documents.

5. Appareil d'impression de documents du type formulaire à remplir selon la revendication 4, caractérisé en ce que ladite mémoire de données d'impression comprend une mémoire-tampon (4) de données variables pour recevoir lesdites données relatives aux caractères d'impression variables et une mémoire de données répétitives (3) pour recevoir lesdites données relatives eux caractères d'impression répétitifs.

6. Appareil d'impression de documents du type formulaire à remplir selon la revendication 5, caractérisé en ce que lesdits moyens pour combiner comportent:

une mémoire-tampon (8) de configuration d'impression pour recevoir et mémoriser lesdites données relatives aux caractères d'impression variables;

une mémoire-tampon (6) de formulaire pour recevoir, combiner et mémoriser lesdites données d'impression du formulaire et lesdites données relatives eux caractères d'impression répétitives;

uné mémoire-tampon de sortie (9) pour recevoir, combiner et mémoriser le contenus de ladite mémoire-tempon (8) de configuration d'impression et de ladite mémoire-tempon (6) de formulaire.

7. Appareil d'impression de documents du type formulaire à remplir selon la revendication 6, caractérisé en ce que lesdits moyens de transfert comportent une section (1) de commande d'entrée reliée à ladite mémoire (2) de formulaire, à ladite mémoire (3) des données relatives aux ceractères répétitifs, et à ladite mémoire-tampon (4) des données relatives aux caractères variables et conçue pour être reliée à un ordinateur principal pour en recevoir lesdites données relatives aux caractères d'impression variables, lesdites données relatives aux caractères d'impression répétitifs et lesdites données d'impression du formulaire.
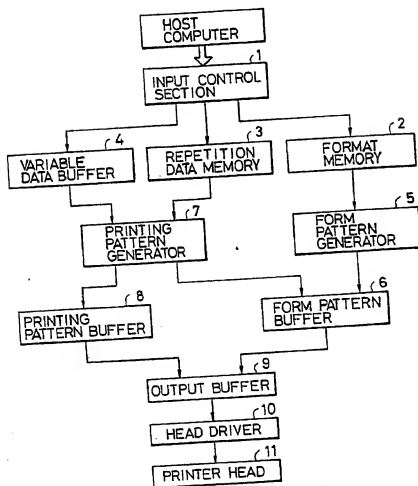
8. Appareil d'impression de documents du type formulaire à remplir selon la revendication 7, caractérisé en ce que lesdits moyens de production comportent:

une tête d'imprimante (11); et

un circuit pilote (10) de tête d'imprimante pour commander le fonctionnement de ladite tête d'imprimante (11) en accord avec lesdits signaux de commande d'impression.

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FIG. 1

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          ┌──────────────┐
          │    HOST      │
          │  COMPUTER    │
          └──────┬───────┘
                 ↓        ⌐1
          ┌──────────────┐
          │ INPUT CONTROL│
          │   SECTION    │
          └──────┬───────┘
       ┌─────────┼──────────────┐
    ⌐4 │      ⌐3 │           ⌐2 │
┌──────────┐ ┌──────────┐ ┌──────────┐
│ VARIABLE │ │REPETITION│ │  FORMAT  │
│DATA BUFFER│ │DATA MEMORY│ │ MEMORY  │
└────┬─────┘ └────┬─────┘ └────┬─────┘
     │         ⌐7 │           ⌐5 │
     │     ┌──────────────┐ ┌──────────┐
     │     │   PRINTING   │ │   FORM   │
     └─────│   PATTERN    │ │  PATTERN │
           │  GENERATOR   │ │ GENERATOR│
           └──────┬───────┘ └────┬─────┘
              ⌐8  │            ⌐6 │
    ┌──────────────┐      ┌──────────────┐
    │   PRINTING   │      │ FORM PATTERN │
    │PATTERN BUFFER│      │   BUFFER     │
    └──────┬───────┘      └──────┬───────┘
           │          ⌐9         │
           └──────┬──────────────┘
          ┌──────────────┐
          │OUTPUT BUFFER │
          └──────┬───────┘
                 │    ⌐10
          ┌──────────────┐
          │ HEAD DRIVER  │
          └──────┬───────┘
                 │    ⌐11
          ┌──────────────┐
          │ PRINTER HEAD │
          └──────────────┘
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FIG. 2

TRANSFER SIGNAL

FORMAT DESIGNATING DATA	F1	
REPETITION DATA	R1	CONTENTS AND FORMS OF PRINTED BUSINESS FORM
VARIABLE DATA FOR 1ST PAGE	X1 ⟹	F1 R1 X1
VARIABLE DATA FOR 2ND PAGE	X2 ⟹	F1 R1 X2
⋮		⋮
VARIABLE DATA FOR N-TH PAGE	Xn ⟹	F1 R1 Xn
REPETITION DATA MEMORY – CLEAR		
REPETITION DATA	R2	
VARIABLE DATA FOR 1ST PAGE	Y1 ⟹	F1 R2 Y1
VARIABLE DATA FOR 2ND PAGE	Y2 ⟹	F1 R2 Y2
VARIABLE DATA FOR 3ST PAGE	Y3	⋮